

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

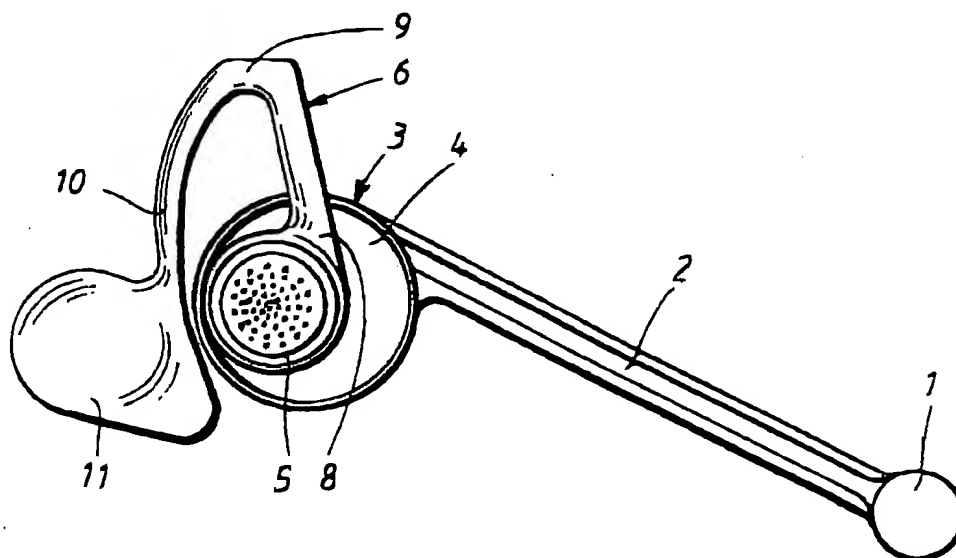
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> : <b>H04M 1/05, H04R 1/08, 1/10</b>	<b>A1</b>	(11) International Publication Number: <b>WO 95/15044</b> (43) International Publication Date: <b>1 June 1995 (01.06.95)</b>
<p>(21) International Application Number: <b>PCT/SE93/01003</b></p> <p>(22) International Filing Date: <b>22 November 1993 (22.11.93)</b></p> <p>(71)(72) Applicant and Inventor: <b>ULLMAN, Johan (SE/SE); Johannebergsgatan 32 B, S-412 55 Göteborg (SE).</b></p> <p>(74) Agents: <b>GRAUDUMS, Valdis et al.; Albihn West AB, P.O. Box 142, S-401 22 Göteborg (SE).</b></p>	<p>(31) Designated States: <b>AU, CA, DK, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</b></p> <p><b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Swedish).</i></p>	

(54) Title: **TELEPHONE COMMUNICATION HEADSET**

## (57) Abstract

A telephone communication headset for attachment to the outer ear of an operator and comprising a main unit (3) which supports an arm (2) with a microphone (1) at its outer end, and an earphone (5) on the main unit. Furthermore, a U-shaped support (6) is arranged with a first and a second downwardly-directed shank, said support (6) being attached to the main unit. A connecting upper portion (9) is arranged between the two shanks, which portions is arranged, in a position of use, to rest against the uppermost point of the outer ear, where the outer ear attaches to the skull. A weight (11) is arranged so that its mass and leverage presses the rear shank (10) of the support (6) towards the rear side of the outer ear and into the fold between the outer ear and the skull. The effect of gravity on the microphone (1) and the microphone-arm (2) is also counter-balanced. The telephone headset is hereby held in position by the pressing action of the rear shank and the torque about said suspension point by way of gravity.



WO 95/15044

PCT/SE93/01003

5       **TITLE**  
      Telephone communication headset

**TECHNICAL FIELD**

10       The present invention relates to a telephone communication headset comprising an earphone, a microphone, and means for holding the headset by the operator's head.

**BACKGROUND OF THE INVENTION**

15       Many people spend a large part of their working day on the telephone. In spite of access to loudspeaker-telephones it is still common practice to hold the receiver against the shoulder when both hands are needed for turning pages etc.

20       Loudspeaker-telephones do not give an adequate sound quality, which is why they are seldom used for more than making the connection and conference-conversations.

25       When using the telephone in a car the wind-noise constitutes an additional inconvenience factor during so-called hands-free operation. It is, however, not suitable to hold the receiver by hand, and in certain situations even dangerous, and holding it against the shoulder is even more  
30       dangerous or, in many cases, not even possible.

      An additional type is represented by telephone receivers which are worn on the head, so-called headsets. A telephone headset is previously known which consists of a U-shaped support extending over the top of the head from one ear to  
35       the other. On one of the shanks of the U-shaped support, or sometimes on both, an earphone is positioned, which is

---

WO 95/15044

PCT/SE93/01003

2

pressed against the ear with a flat portion. The U-shaped support additionally carries a microphone arrangement extending forwardly to the operator's mouth. This device enables a firm hold of the apparatus, but nevertheless suffers from a number of inconveniences.

- It requires two hands for donning and removal.
- It presses against the ears, which creates discomfort.
- 10 - It makes you feel closed off.
- It ruins your hairstyle.
- It takes up a great deal of space.
- It is difficult to use at the same time as with wearing glasses.
- 15 - It produces a psychological resistance due to its appearance.
- It takes up a lot of space when not in use.

Telephone headsets of this kind are currently used, due to the above inconveniences, predominantly by persons working with telephone communication long working hours and particularly in noisy environments. Nowadays however, telephone communication takes place more and more often simultaneously with other activities, such as driving and customer service, for example in hotel receptions. In such cases, said inconveniences are unacceptable. Particularly in conjunction with customer service it is necessary to have the telephone receiver as un-noticeable as possible, whilst allowing alternating telephone communication and direct calls to another person without requiring handling.

Therefore, another type of headset has been provided, which is worn directly on the ear without any U-shaped head support and which may thereby have a smooth shape and low weight, such that wearing it becomes almost unnoticeable and barely noticeable for bystanders. Telephone receivers

and headsets of this type are known from US,A,4 893 344 (Trägardh et al) and EP,A2,0 396 300 (Scott). These devices, as well as other devices of the same main category require a support by clip-action around one of the operator's ears. The leverage from the microphone-arm of the device is hereby counter-acted, said arm having to be made to a certain length since it is designed to extend from the ear to a position close to the mouth, where its sound-receiving opening should be positioned. This clip-action on the outer ear results in the device having to be provided with an adjustable means, which may have to be handled in each donning-situation and particularly if the headset is transferred between different persons. The contact required for the support may result in discomfort and if, on the other hand, it is too loose, the receiver will have an unsteady support and there is a particular risk of the relatively long microphone-arm rotating downwardly as a result of body-movements, and thus being displaced from its position.

#### SUMMARY OF THE INVENTION

The telephone headset according to the invention belongs to the second mentioned type of headset. The invention is thereby directed towards eliminating said disadvantages and achieving such a steady support in the position of use, that said position is maintained even when the operator is moving, without resorting to special supporting means. This is achieved according to the invention by a weight-balancing of the headset, such that it strives to maintain its correct position by way of gravity.

**BRIEF DESCRIPTION OF THE DRAWINGS:**

5 An embodiment of the invention will now be described, as illustrated in the accompanying drawings, in which :

Fig. 1 shows the headset in a side view from its inside;

10 Fig. 2 shows a side view from its outside;

Fig. 3 shows a view from above; and

15 Fig. 4 shows the headset on an operator's head as seen in a side view.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

20 With reference to the figures, the active part of the telephone headset comprises a microphone 1 with an arm 2, supporting the same on a main unit 3. Said main unit comprises a housing 4 with an earphone 5 and a U-shaped support 6 journaled in said housing.

25 The microphone-arm 2 extends from the forwardly facing edge of the housing 4 in a position of use. The centre of the journalling which renders the support rotatable relative to the housing, is displaced towards the rear edge of the housing. In the embodiment, the circular earphone 5 is utilized for journalling the U-shaped support 6, which  
30 support encloses the earphone with an inner portion 8. From said inner portion, there extends a U-shaped portion 9 which, at its outer end 10, is terminated in an outwardly protruding casing 11 (as seen in Fig. 3) for an inserted counter-weight of a heavy material. As can be seen further  
35 in Fig. 3, the portion 9 of the support is angled inwardly relative to the axial main plane of the main unit 3.

WO 95/15044

PCT/SE93/01003

5

In Fig. 3, it can be seen that the main unit 3 with its outer surface forms a complete casing. A control button 12 is however positioned in this casing.

5     The embodiment shown in the figures is intended to operate  
      in a wireless manner. Thus, it will be connected, via a  
      radio linkage, to a stationary or mobile telephone device  
      of some kind, by means of which communication may be main-  
10     tained with a telephone network. The device must also be  
      provided with means for selecting a number to a desired  
      receiver in external communication. The design of such main  
      units for wireless telephones are well known in the art and  
      will not be described in more detail here. It should  
      however be added that it is sometimes preferred to control  
15     the telephone unit by way of voice control, in certain  
      installations, instead of using a keyboard or the like for  
      selecting a number. Said voice control is also covered by  
      the invention. If another wireless communication, other  
      than with radio waves, is to be used, for example by  
20     transmittal with infra-light, the telephone will of course  
      be adapted accordingly, which is well known practice. It is  
      by no means excluded that the headset is connected with a  
      cable to the main unit, but some of the freedom and comfort  
      that the headset according to the invention offers, will  
25     hereby be lost.

      The main unit 3 is used not only as a support for the  
      microphone-arm, the earphone and the U-shaped support, but  
      also as an apparatus casing for the electrical/electronic  
30     equipment in the headset. In a wireless embodiment, this  
      consists of a transmitter which receives signals from the  
      microphone 1 via a conduit extending in the arm 2, and a  
      receiver which is in contact with the earphone 5. The  
      microphone conduit may thereby constitute an antenna and a  
35     second antenna-branch (ground) may be positioned in the U-  
      shaped support 6 and, if needed, be connected to the

6

counter-weight in the casing 10. Additionally, means may be arranged for interference elimination, automatic sound-control etc. Finally, the casing must also contain a battery for power supply.

5

Certain parts of the necessary equipment may alternatively be placed in the U-shaped support and preferably in such a way that they constitute a part of the mass of the counter-weight by being placed in the casing 11. The battery is particularly suitable for this purpose.

10

The button 12 on the outside of the casing is pre-supposed to be connected for switching the device on and off. Alternatively, other means may be arranged for this purpose. For example, the turning of the U-shaped support 6 between different positions may be used for this control.

15

Fig. 4 shows how the device according to the invention is intended to be suspended by way of the U-shaped support 6 on the operator's ear. In the figure, the vertical line through the ear on this intended operator is indicated by the line 14, said line extending through the uppermost point, denoted 15, where the outer ear is attached to the skull. This means that the U-shaped support 6 will be situated closely adjacent the skull and thus on the inside of the earphone. The device is balanced in such a way by means of the counter-weight, that the centre of mass of the headset is on or preferably behind said vertical line 14 through the point 15, so that it is held in place by gravity alone when the head is in its normal upright position, which it usually is when the operator is sitting or standing up.

20

25

30

WO 95/15044

PCT/SE93/01003

7

5 In this position, the headset is supported by the head of the operator, so that the microphone 1 is held in place close to the mouth and the earphone 5 is held in place close to the ear.

10 The masses of the device, which are substantially represented by the microphone 1 and its arm 2, the main unit 3 with the earphone 5 and the counter-weight on the U-shaped support 6, are distributed in such a way that the centre of mass of the device in the longitudinal plane (horizontally in a position of use and substantially parallel to the sagittal plane of the operator) is positioned on or behind the vertical line 14 extending through said uppermost point 15, where the outer ear is attached to the skull, and laterally in the frontal plane relative to said line and outside of the abutment surface of the U-shaped support, in such a way that the effect of the gravitational force on the device will press it inwardly towards the head and at 20 the same time against the rear side of the ear and into the fold between the rear portion of the outer ear and the skull of the operator. It is important that the U-shaped support is shaped for this position; as shown, it is relatively thin (see Fig. 3). A wedge-shape may, however, 25 also be advantageous.

30 As shown, the headset according to the invention is held in position mainly by the effects of gravitational forces, which are given such a distribution and have such directions that a correct position may be maintained without the use of clip devices. This is achieved, on the one hand, by said counter-weight, having a mass and a position such that it strives to turn the entire device in a clock-wise direction (as seen in Fig. 4), around said resting point 15 against 35 the uppermost connection between the outer ear and the skull. This results in the microphone-arm being held in the



WO 95/15044

PCT/SE93/01003

8

desired angle with the microphone close to the mouth of the operator and in the end-portion of the U-shaped support with the counter-weight being pressed against the rear side of the outer ear and into the fold between the ear and the skull. By suitable adaptation of this pressure point as well as of the abutment surfaces (mainly the casing of the counter-weight) a very secure holding action may be achieved. It may be added that the tissue in the fold behind the ear is relatively hard and not particularly sensitive to pressure.

In the embodiment, the weight is placed on the rear shank 10 of the U-shaped support. This is advantageous since it is said shank 10 that will be used to relieve said stress due to the weight. It is however possible to place the weight, i.e. the weight of the shank, in some other part behind the suspension point 15. This part of the headset must thereby be connected to the shank for effecting said gravitational influence.

As mentioned, the U-shaped support is rotatable about the receiver in the embodiment. In this way, the entire device may, after suspension on the ear, be rotated about the fixed point represented by the U-shaped support, so that a microphone position is obtained, which is suitably adapted to the physiognomy of the operator. The rotatability of the U-shaped support is thus not intended to provide a clip-action, since such a clip-action is, as mentioned, not necessary.

With wire-transmittal, the wire needed for communication with the connected equipment will be attached in a manner such that its weight is utilized for determining the centre of mass of the device, for example by having it attached to the device laterally from the outside and it will also, by

WO 95/15044

PCT/SE93/01003

9

means of its stiffness, act as a lever with its most proximal portion.

5 By making the device attachable on a telephone or a radio receiver-set, one may vary between using it as a headset and using the entire system as an ordinary telephone receiver.

10 If the device communicates wirelessly with other equipment, it is unnecessary to wear, or bring, other equipment. It may, however, also be made to communicate wirelessly with other body-worn equipment.

15 Its batteries may for instance be of the kind that are inductively rechargeable or rechargeable via contact with other equipment.

20 It may be provided with a microphone having a directional effect for decreasing the need for length of the microphone arm and decreasing the risk of consecutive working.

---

WO 95/15044

PCT/SE93/01003

10

5      Claims

1.      A telephone communication headset for attachment to the outer ear of an operator and comprising a main unit (3) which supports an arm (2) having a sound-receiving opening for a microphone (1), said opening being positioned substantially at the outer end of said arm (2) and at a distance from the main unit, and an earphone (5) on or adjacent the main unit and furthermore, a substantially U-shaped support (6) and a first, frontal shank being directed downwardly in a position of use, which shank is attached to the main unit, and a second, downwardly-directed rear shank (10) which occupies an opposing position to the microphone arm relative to the main unit, and an upper portion between the two shanks and connecting the two shanks, said upper portion (9) being arranged, in a position of use, to rest against an upwardly-directed portion of the outer ear of the operator, c h a r a c t e r i z e d in that said upper portion (9) connecting the two shanks of the U-shaped support (6), is shaped so as to support the headset by resting mainly against the uppermost point (15) of the outer ear, where the outer ear attaches to the skull, and that a weight is so arranged that its mass and leverage is adapted, at least in an upright position of the wearer's head, to press the rear shank (10) of the U-shaped support (6) against the rear side of the outer ear and preferably into the fold between the outer ear and the skull by way of gravity and by balancing the leverage from the effect of gravity on the microphone (1) and the microphone arm (2), so that the headset is held in position by means of said pressing of the rear shank and by the torque effected by gravity, about said suspension point

WO 95/15044

PCT/SE93/01003

11

(15) at the uppermost part of the outer ear where it attaches to the skull.

2. Telephone communication headset according to claim  
5 1, c h a r a c t e r i z e d in that said mass is placed  
outside the inner surface of the U-shaped support (6)  
which, in a position of use, will form an abutment surface  
against the skull, so that said surface of the support is  
pressed inwards against the skull by the inwardly-turning  
10 leverage effected by the weight.

3. Telephone communication headset according to claim  
1 or 2, c h a r a c t e r i z e d in that the weight, at  
least to a major extent, is supported by said rear shank  
15 (10) of the U-shaped support (6).

4. Telephone communication headset according to any of  
the preceding claims, c h a r a c t e r i z e d in that  
the rear shank (10) of the U-shaped support (6) is arranged  
20 with such shape and dimensions that it may occupy a  
position within the fold between the rearwardly facing  
surface of the outer ear and the opposing surface of the  
skull.

5. Telephone communication headset according to any of  
the preceding claims, c h a r a c t e r i z e d in that  
main unit (3), a part from being arranged to support the  
microphone arm (2), the earphone (5) and the U-shaped  
support (6), is shaped so as to form a casing for enclosing  
30 active equipment such as electronics.

6. Telephone communication headset according to any of  
the preceding claims, c h a r a c t e r i z e d in that  
the mass of the weight is at least partly constituted by  
35 active equipment such as a battery for the operation of the  
headset.

WO 95/15044

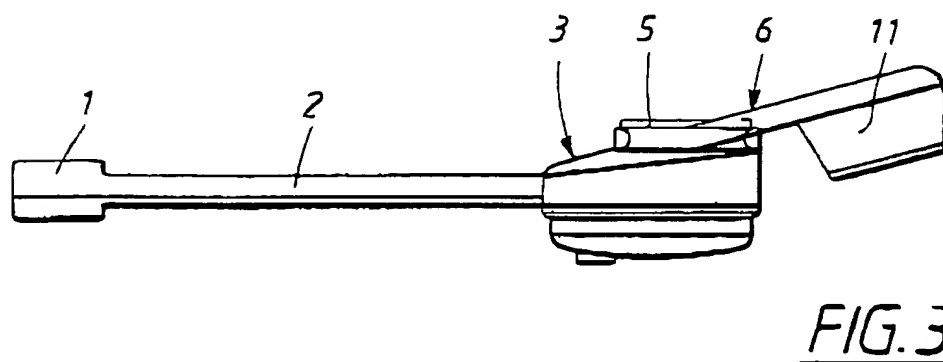
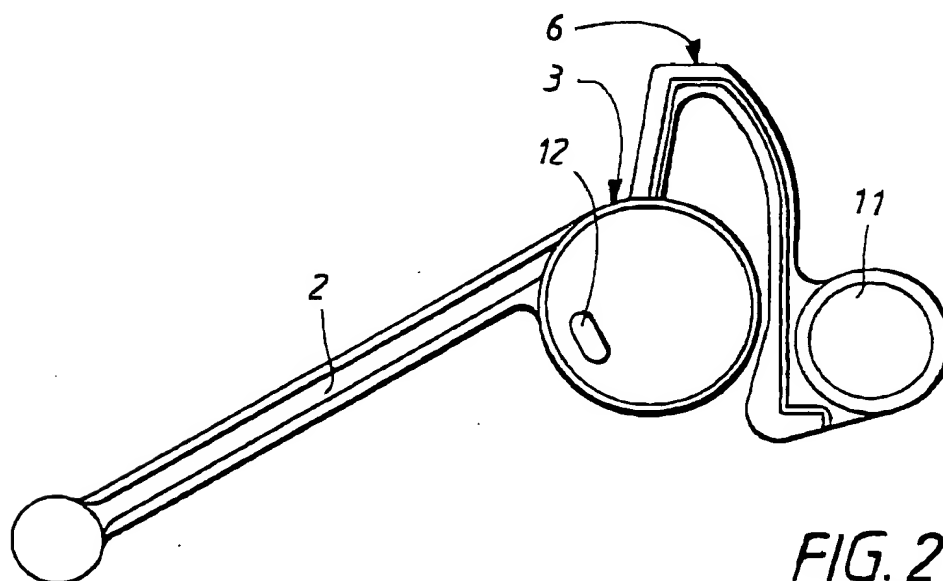
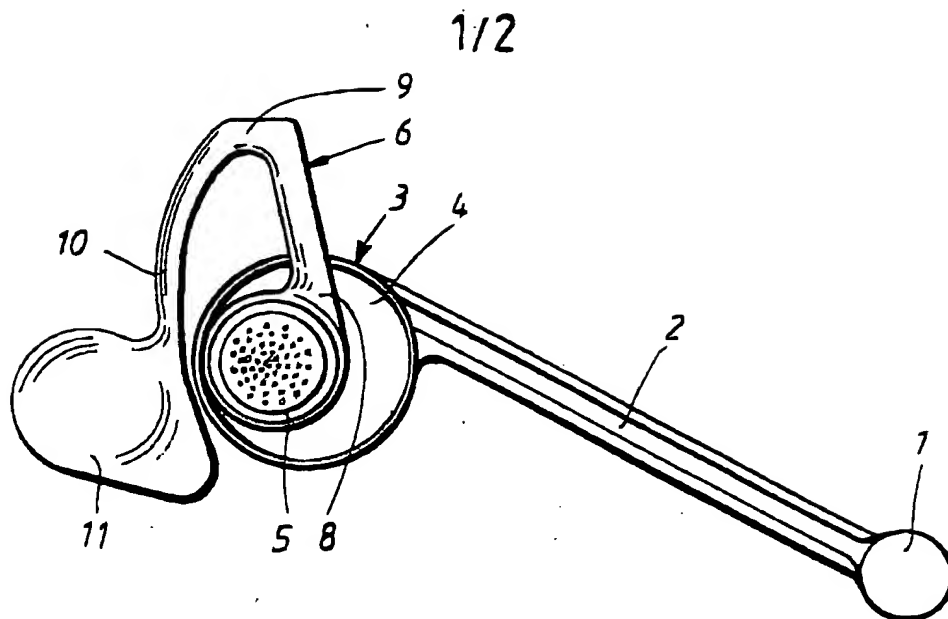
PCT/SE93/01003

12

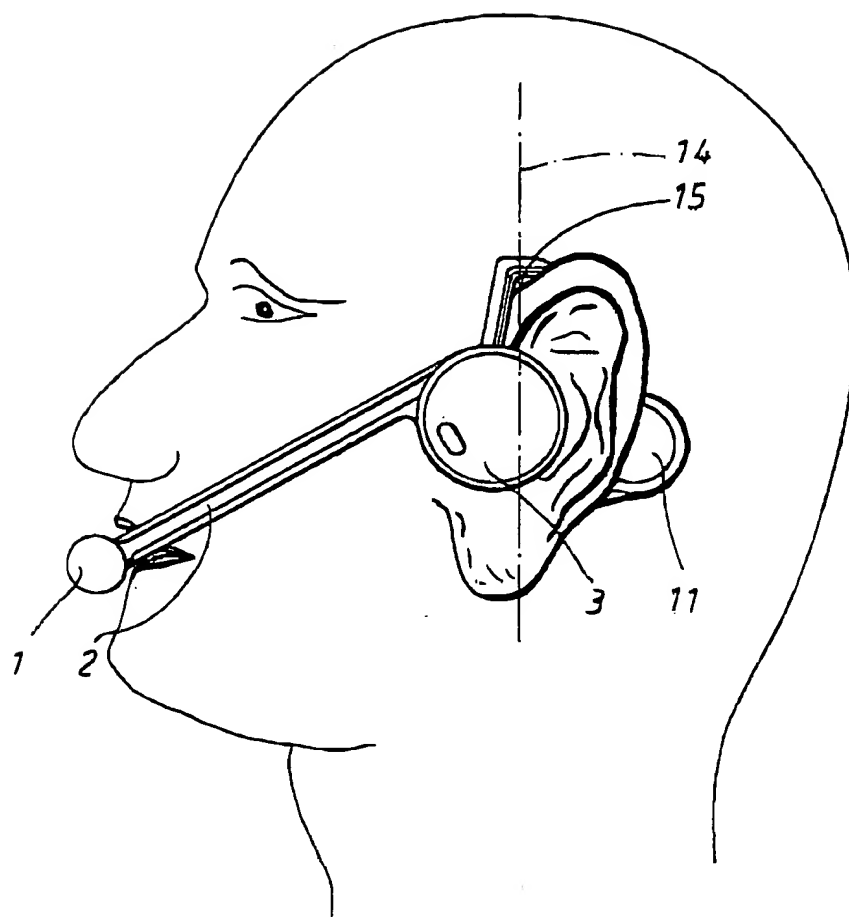
7. Telephone communication headset according to any of the preceding claims, characterized in that the main plane of the U-shaped support (6) is turned inwardly in a direction towards that side of the headset which is intended to be turned inwardly against the  
5 wearer's head relative to a main plane through the microphone-arm (2).

8. Telephone communication headset according to any of the preceding claims, characterized in that U-shaped support (6) is rotatable relative to the main unit (3) about an axis substantially perpendicular to the main plane of the support (6), so that the main unit (3), together with the microphone arm (2) attached to the same,  
10 may be rotated about the fixed element which is formed by the support (6) on its attachment on the ear of the operator, so that the position of the microphone-arm, relative to the mouth of the operator, may be adjusted.  
15

20



2/2

FIG.4

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☒ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**